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THE EFFECTS OF AGE AND SEX ON ACHIEVEMENT AND BEHAVIOR IN GRADE FOUR

by

© CLAYTON C. REYNOLDS

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION IN COUNSELLING PSYCHOLOGY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "The Effects of Age and Sex on Achievement and Behavior in Grade Four" submitted by CLAYTON C. REYNOLDS in partial fulfillment of the requirements for the degree of Master of Education in Counselling Psychology.

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DATE Sept. 5 1974

DEDICATION

To My Parents

ABSTRACT

The present investigation was conducted with 198 students enrolled in regular classrooms in the Spruce Grove Elementary Schools, County of Parkland. Testing was done in May, 1974, with the Canadian Tests of Basic Skills and the Canadian Lorge-Thorndike Intelligence Tests. Teacher ratings of students including the use of the Walker Problem Behavior Identification Checklist (WPBIC) were gathered.

Comparison between students who were six or under at time of grade one entrance with those who were over six showed that the younger group performed significantly lower on the achievement scales of Punctuation, Math Concepts, and Total Math. This group also had a greater number selected as likely to benefit by repeating their present grade. Boys as a group were significantly lower than girls on the achievement scales of Spelling, Capitalization, Usage, and Total Language and were also selected more often as likely to benefit by repeating the grade.

In spite of these findings, an inspection of the size of differences led to the general conclusion that no particular age or sex group was at a severe achievement disadvantage.

Mental age correlated most highly with achievement, followed closely by correlations between I.Q. and achievement. Because the six or under group tested significantly higher in mean I.Q. an analysis of covariance was conducted with achievement. This substantially increased the achievement differences between the two groups, making them all significant in favor of the older students. Since I.Q. was calculated in a post hoc manner, however, the implication of this finding remains open to question.

Sex rather than age showed a relationship to student behavior with boys rated as presenting more problems than girls.

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CHAPTER I

INTRODUCTION

The age at which a child should enter grade one has long been a debatable issue. Custom, perhaps originating out of the necessity of students being mature enough to travel distances to school, as well as objective attempts at finding the minimal age to achieve in required tasks, have both contributed to present day policies. Minimum attendance ages in North America today show much greater homogeneity than in the past, centering around the sixth year. Although considerable doubt has been expressed (Sowards, 1969, p. 425) over the advisability of using chronological age alone as the standard for admission, it is still the most widely used criterion.

Many researchers in reading (Morphett and Washburne, 1931; Harrison 1936; Hefferman, 1960) have stressed the importance of a minimal mental age of six years, five months before formal instruction can be successfully introduced. Gates (1937) however, said that such statements were essentially meaningless, and that the age for learning to read has to be related to the type of instruction and the program used. Such controversies are part of a larger issue relating to readiness and its influences. At one extreme are those who believe maturation to be primarily the result of genic factors (Gesell, 1954; Ilg & Ames, 1950, 1951, 1972; Ames, 1967). These writers stress that environment can support growth, but is not a causal factor in its initiation (Tyler, 1969). Ilg & Ames (1964) warn against the early placement of children and advocate that a child have the maturity of a six year old before entering grade one. In contrast to this stress on internal ripening, others maintain

that readiness is more the result of previously learned intellectual skills. Quintillian in the first century, advocated that a boy's education begin as soon as he talks, for "every hour saved in early childhood is so much acquired later on (Cole, 1961, p. 50)." In more recent times, Bruner (1961) has proposed that "the foundations of any subject may be taught to anybody at any age in some form (p. 12)." The logical outcome of this position is that keeping a child out of school for reasons of immaturity would serve no useful purpose and that instead, appropriate instructional techniques and subject matter should be found to stimulate him.

Few psychologists and educators today would deny the importance of either maturation or environment on a child's development. However there is no consensus which plays the more important role. Ollila (1971) quotes a number of experiments done in the late fifties and early sixties that demonstrated children can successfuly learn to read at ages five, four, and even down to two. She mentions that "These studies, popularized in magazines and newspapers, were combined with the child development movement away from leaving all to maturation and toward nurturing learning abilities instead (p. 2)." Tyler (1969) cites evidence that gives support to the importance of the environment on readiness. He points out, however, that although children may be capable of learning skills at an earlier age than has previously been advocated, we can still ask about its desirability. "Are they being subject to undue pressure? Is it harmful? In fact, are there excessive demands at all levels of education which are affecting students' attitudes towards both school and society (p. 1063)?" Doll & Fleming (1966) felt pressures in some schools were very real, even leading to personal tragedy.

The Problem Under Investigation

The use of chronological age as criterion for school entrance has the advantages of being well defined, objective, and requiring minimal effort in admission procedures. However, it is obviously not sensitive to individual differences that exist among children of the same age. A child's social, emotional, intellectual and physical development are among factors important in the learning environment.

With greater sophistication in testing, mental ages and performance on readiness tests have become adjuncts of the chronological age criterion for admission. Dey (1960) found that a major practice for admission involved the setting of a legal age of six, with exceptions being made for younger children whose performance on psychological tests etc., indicated they stood a good chance of surviving the formal instruction of the first grade program.

The present study, which was done on students in Spruce Grove in the County of Parkland, arose out of the concerns regarding the exclusive use of chronological age for admission. Through the years, schools within the County of Parkland, which is located just west of Edmonton, have witnessed the extension of the age deadline for beginners from December 1 to February 28 of the school year. Thus, any child who will be six by the following February 28 is accepted into grade one. This means the legal minimum starting age is five and one-half years. Although Metropolitan Readiness Tests are administered to all entrants, their function is mainly to assist in initial evaluation and grouping for instruction. Teachers have expressed concern over the young age of many of the beginners, and feel that had they waited another year, better progress in school would have resulted.

Studies have been done relating age of entry to later achievement, but few of these studies have been done in Alberta. Bevington (1957) conducted research in the Edmonton Public System and found no significant difference between chronological age and achievement. However, regulations for entry required that a student be six years of age by September 1. Younger entrants were accepted up to February 1, providing they had a mental age of five years, nine months. Thus the younger group in this study was not selected on chronological age alone.

One of the main concerns of the present study is to look at the relationship between age at entry into grade one, and later achievement. The students selected for this study are in grade four in the Spruce Grove Elementary Schools. Another of the concerns will be the extent to which teachers view the younger students as having behavioral problems. In addition to using chronological age, sex and mental age will also be studied as they relate to academic achievement and the frequency of behavior problems.

Purpose of the Study

In summary, the purpose of this study is an attempt to answer the following questions:

1. Is there a difference in school achievement between those students who started school just on or before their sixth birthday as opposed to those who started after their sixth birthday?
2. Is there any difference in the level of achievement between boys and girls?
3. Do teachers select students who have begun school at an earlier age as having more behavioral problems?
4. Do teachers select more boys or girls as presenting behavioral problems?

5. Do teachers select more students who began school early as possibly benefiting by repeating the grade?
6. Do teachers select more boys or girls as possibly benefiting by repeating the grade?
7. To what degree are a student's achievement and behavioral problems related to mental age?

Limitations of The Study

This study makes no attempt to compare and assess various readiness tests, entrance policies, class grouping procedures or curriculum. It is restricted to studying grade four students in regular classrooms. Students who failed a grade were excluded from the analysis. Because only grade four students from the geographical area of Spruce Grove were used for purposes of this study, generalizations to other grades and localities will have to be done with caution.

Definitions

For this study the following operational definitions will be used:

Chronological Age at Time of Entrance: The chronological ages in this study will be those of the pupils when they entered grade one. Calculations will be made from the month of September. In this way, someone born in October would have a chronological age of five years, eleven months. A February birthday would result in a chronological age of five years seven months.

Early Entrants: Early entrants are those pupils who had a chronological age between five years, seven months and six years, zero months. Their sixth birthday would have fallen between September 1, 1970 and February 28, 1971 inclusive.

Late Entrants: Late entrants are those pupils who had a chronological

age between six years, one month, and six years, eight months. Their sixth birthday would have fallen between January 1 and August 31, 1970 inclusive.

Intelligence (Verbal and Non-verbal): Intelligence is that which is measured by the Canadian Lorge-Thorndike Intelligence Tests, Level B of Form 1 (Wright, 1967).

Mental Age (Verbal and Non-verbal): Mental age is that which is derived from the age equivalent scales of the Manual for Administration of the Canadian Lorge-Thorndike Intelligence Tests (Wright, 1967).

School Achievement: School achievement is that which is measured by the Vocabulary, Reading, Language, and Mathematics subtests of the Canadian Tests of Basic Skills, Form 2 (King, 1968).

Student Behavior: Student behavior is that which is measured by the Walker Problem Behavior Identification Checklist, (Walker, 1970) as well as by the teachers' judgments of "best behaved" and "poorest behaved" in their classrooms (see Appendix 1 and 2).

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Unselected Early Entrants

The following review will look at studies which compared early and late entrants in systems where chronological age was the criterion for admission.

An early study was done by Bigelow (1934). She compared a group of children who entered grade one before they were six years of age with a group who ranged from six to six years and four months. She concluded that children of average intelligence who were younger than six years of age would have little chance of success in grade one.

Hamalainen (1952) in a survey of elementary school principals, found that in a group of underage kindergarten students (under four years, six months) 76 per cent made a ready adjustment as contrasted with 94 per cent of those who were older at time of entrance. In grades one to six, the underage group was reported to have more problems than the normal age group in emotional and social adjustment. Likewise, they had greater difficulty in academic achievement in the first three grades.

King (1955) checked the records for achievement, retentions, attendance, and personal and social adjustment of sixth grade early and late entrants. Late entrants averaged 79 months and early entrants 70 months when they began grade one. In all areas investigated, the older group fared better. Difference in achievement was significant at the .05 level even though the early entrant group had a slight advantage in I.Q.

Forester (1956) and Baer (1958) followed students into the upper

grades. Forester discovered that the very bright, very old (78 months of age at the time of entrance to grade one) did excellent throughout school. However, the very bright, very young (66 months of age at time of entrance to grade one) had difficulties from junior high on.

Baer (1958) found that achievement, ratings on personal traits, and lack of retentions favored the older student. However, there was some evidence that the differences between the old and young groups tended to decrease with higher grade levels.

Carter (1956) compared the achievements of 50 matched pairs of underaged and normal aged children in grades two to six. She concluded that, when given the same school experiences, the chronologically older child has the advantage in academic achievement. No figures were given as to how much older the normal age children were. The early entrants were less than six when they began school. Eighty-seven per cent of them did not equal the scholastic achievement of the normal aged group.

The reading achievement of students in grade six was investigated by Hampleman (1959). A study of their records revealed that those who had started school when they were 76 months or older were more successful, although the differences didn't reach statistical significance. The mean chronological age difference between the two groups was nearly five months. When he compared the first and fourth quarters of the whole group of subjects, he found a mean age difference of nearly eight months, with the older group having a mean reading advantage of almost seven months. The mean intelligence quotients for the two groups were practically the same.

In part of his study, DeWitt (1961) also found significant differences favoring the older child in grades four, five and six. When he

controlled for intelligence factors, the differences were not as noticeable.

Gott (1963) rejected the null hypothesis that age of entrance is not a significant factor in achievement and adjustment in the elementary grades. His age of entrance was relative to kindergarten, and involved a difference of nine to eleven months between oldest and youngest children. Differences in achievement were greatest in the primary grades, although in Arithmetic they were significant throughout grades one to six. The older students were described as adjusting better to peers and adults, as showing more initiative and independent study habits, and achieving more leadership honors.

Approximately eighty per cent of 801 retentions in elementary school were found by Hall (1963) to be students who were less than 78 months of age when entering grade one. On an achievement test given to pupils in this sample in grades three and six, it was concluded that both overage boys and girls did better than the underage of the same sex, and that the deadline for beginners should be kept at six by September 15.

Dickinson and Larson (1963), using the Iowa Tests of Basic Skills on fourth graders, found significant differences at less than the .05 level favoring the older group. Like Kings study (1955) the younger group had a higher mean I.Q., although the difference was not significant.

Carroll (1963) chose to study third graders in which the mean age of the younger group averaged 70 months at entrance to grade one, while the older group averaged 77 months. The respective mean I.Q. scores of the two groups were 116 and 115. Significantly better academic progress was made by the overage group. Teacher adjustment ratings, though lacking significance, favored the older group.

Johnson (1964) found that children who enter school prior to their sixth birthday did less well in reading than the older children throughout the first five years of schooling. As well, they had a greater percentage of emotional problems, although the differences were not significant.

The records of grade four and five students were studied by Halliwell and Stein (1964). Results in achievement again significantly favored the older students who ranged in age from 76 to 81 months at time of entrance, whereas the younger students ranged from 70 to 75 months.

Clarke and Drowatsky (1972) compared mental, social, and physical characteristics of boys from ages seven to twelve who were underaged in their grades, with boys who were modal aged. The underaged in a grade had birthdays from January to May, while the modal aged had birthdays within the August to September period of the previous year. Generally, they concluded that the underaged boys in a given school grade were less mature physically, had less strength, and did less well on tests of motor ability. Mean scholastic achievement was lower, although no differences existed in intellectual ability. Significant differences were reported in grades two, four, five and six, with grade four being the most critical in terms of these differences. They concluded that a school entrance policy based entirely on chronological age is inadequate.

Whyte (1972) divided grade eight students into 510 early and 510 late entrants. Achievement data on their records for grades three, six, and eight were studied. Students classified as early entrants achieved significantly lower (.001 level) than the late starters across the grades. The same level of significance was found for retentions in grade one, again discriminating against the early entrant. Flexibility in school

entrance laws was recommended.

Kerr (1973) analysed the birthdates of 122 poor achievers and 134 average achievers selected as such by their teachers. These children ranged from kindergarten to grade two. He found those whose birthdays fell between September and January, making the the youngest half in their grade, were significantly more often picked as poor achievers.

Few exceptions to the general findings in the above studies were found. Burnham (1973) concluded there was comparable performance between early and late starters on tests given in grade two. However, the older students had a slight advantage in Arithmetic. In grade one this advantage was significant. This study was looking at a modified enrollment policy in kindergarten classes. Children who were less than five years old by the regular cut-off date of December 31, but who would be five by March 21 of the school year, were allowed to enroll if the number of regular pupils was less than 25 in a class. No other screening was carried out. Although differences in achievement were not significant in grade two, the younger group was probably somewhat atypical, in that they had a mean I.Q. advantage of 115 over 102 for the regular entrants.

Miller and Norris (1967) while agreeing that studies indicate the younger child, especially the average or below average in maturity, are at a disadvantage, hypothesise that this would not be the case if programs were designed to meet individual needs. Their sample came from students in grade four and five, all of whom had spent their earlier years in a non-graded primary unit. Three groups were formed relative to entrance age in September -- early (five years, eight months through five years, eleven months), normal (six years, zero months through six

years, seven months), and late (six years, eight months through six years eleven months). They found that early entrants were at a significant disadvantage on tested readiness, but signficant achievement differences did not persist beyond grade one. Grade retentions and referral for psychological services were also similar to the normal group. The late group was rated the least well adjusted. A recommendation from the study was that children as young as five years, eight months be admitted to school, providing the program is flexible enough to give instruction at various developmental levels.

Similarly, Weinstein (1969), investigating entrance age and adjustment, suggests that the younger entrants' continued difficulties in later grades can be attributed to "his difficulty in meeting the behavioral and academic expectations of his teachers and perhaps of his classmates in the early school years (p. 27)." Thus, his negative experiences develop into a self-fulfilling prophecy which carries on into later years. The real issue on school entrance then, is age relative to classmates rather than an optimal age for learning, as the literature she feels, has concentrated on in the past. Williams (1964) expressed a similar idea. Weinstein (1969) investigated the adjustment of children in two different schools which had different entrance ages. The results supported her hypothesis on relative age. Choppin (1969) however, looked at an international study in Mathematics achievement (Husen, 1967) and concluded that, although there is no doubt that achievement varied with age, being younger or older than the class average did not seem to be of first importance. Weinstein (1969) concluded that even in the traditional class, proper grouping to reduce the range of abilities, would reduce the long term effects of being a young entrant.

The above studies give strong evidence that when a chronological age criterion is used alone for school entrance, the younger group does less well academically, and is likely to experience greater difficulty in adjustment. However, it is suggested that these negative effects can be ameliorated by appropriate groups and programming. Miller and Norris (1967) cautioned that "The effects of age at entrance upon subsequent school success remain open to empirical investigation. Local conditions vary so widely that it is difficult to generalize beyond the situation studied (p. 58)."

Both she and Langerack (1960) indicate the need to assess locally the relationship between entrance age and success.

Selected Early Entrants

The following review deals with the achievement and adjustment of students admitted under flexible admission programs. Underage students were given special assessments, and the more advanced were allowed to enter with those who met the chronological age deadline. A minimal mental age was a common criterion in deciding whether or not they could enter. However, most studies also considered such factors as social, emotional, and physical maturity.

Handy (1938), in looking at student records from grades one to twelve, reported selected underage students maintained better standing in each grade and showed less immaturity, as reported by teachers, than the regular aged students. To qualify for admission an underage student needed a minimum chronological age of five years and a minimal mental age of five years, eight months. The regular age deadline was six before the following January 1.

Hobson (1948) reported results of a ten year study involving

selective entry of children up to nine or more months below the required age of four years, nine months for kindergarten and five years, nine months for grade one (by October 1). Such children required a mental age of four years, ten months, and five years, ten months respectively. These were later changed to five and six years, In comparing achievement in grades one to eight, the percentage of underage students receiving higher marks was greater than that of the other students, and they had fewer failures. Hobson concluded that the underage children cannot be distinguished physically from the older students after the first year, they have fewer academic difficulties, and they are less often referred for social and emotional problems.

In a follow up study (Hobson, 1963) it was found that the early entering group had significantly more honors and distinctions at graduation (.01 level). As well, they took part in a significantly greater number of extracurricular activities, and a significantly greater number went on to post-secondary education. Hobson concluded that screening children who are within a few months of admission age is an ideal way of providing for individual differences.

Birch (1954) and Cone (1955) also found favourable results. Birch (1954) using follow up statements from principals and teachers, concluded that the underage grade three students in his study were making satisfactory progress in academic, social, emotional and physical development. The minimum age limit at entry to grade one was five years, seven months. Younger students were admitted as young as five years if recommended by a psychologist.

The minimum age requirements in Cone's study (1955) were like Hobson's (1948). Students were considered for early entry up to six

months below these ages. The mental age requirements were five years, two months, and six years, two months for kindergarten and grade one respectively. Looking at student records, he reported better progress for the underaged student, with their level of superiority increasing through the eighth grade. The proportion of underaged receiving marks of "A" was twice that of the older group in five out of the eight grades studied.

Bevington (1957) did a study in Edmonton. He reported no significant differences between scores obtained by different age groups. Records of pupils in their first six grades were used in the study. The are requirement was six years by September 1. The underaged group consisted to students up to six months younger with a mental age of five years, eight months. He stated mental age at time of entrance seems to be a critical factor in later achievement.

Miller (1957) surveyed early and late entrants on achievement, peer acceptance, personal and social adjustment and teacher ratings. Different grades up to grade seven were used for the various studies. Students were accepted into kindergarten if they were five by December 31. The underaged group consisted of those whose birthdays fell in January through March, but were judged sufficiently mature to begin. The mental age criterion was not mentioned. He concluded that screening the children young for grade one is possible, and that they have a good chance of academic and social success.

Although DeWitt's study (1961) did not involve a flexible admission program, it did point out the use of mental age as a selection criterion. By matching children on mental age at school entrance, and comparing them on achievement in grades four, five and six, he found the

younger chronological group had an increasing advantage.

Birch, Tisdall, Barney & Marks (1965) discussed a demonstration of early admission in Pittsburgh. Through extensive testing, 26 children out of 229 who were within a year of being four years, nine months by September 1 were given firm recommendations for an early start in kindergarten. Nineteen of these took part. One requirement was an I.Q. of 130 or higher. When these children were compared with their older peers of like I.Q., no significant differences were found in academic performance in grades one and two. Matching with older children of like mental age again showed no difference. No differences were found on sociometric measures.

Braga (1969) compared children in grades one, three, five and seven who were admitted early (from seven to twelve months younger). No ages were given. I.Q.'s were the same in grades three and seven, and favored the early entrants somewhat in grade five. Mental ages were the same in grades five and seven, and significantly favored the early admits in grade three. On the Iowa Tests of Basic Skills given in grades three, five, and seven, and on the Metropolitan Achievement Test given in grade three, no significant differences between age groups were found. Similarly, no differences were found on general behavior, work habits, and referral for special help.

McLeod, Markowsky, & Leong (1972) found no difference in achievement and social adjustment between the underage and regular starters at the end of grade two. The underage group consisted of 36 children who were up to two months younger than the age requirement of five years, nine months by September 1. The mental age requirement was not stated.

The above studies indicate that the underaged, precocious child

can be screened out and will perform at least as well as the older child in his grade. Reviews by Reynolds (1962) and Braga (1972) lend further support.

Mawhinney (1964) reported on a district which discontinued its early entrance program. The young children were poorer than the older ones in all areas. The selection procedures were not explained, but there were indications that information on the children was less than adequate for proper screening.

Klein & Breniman (1965) also report negative results. Students less than five years old but with a mental age of six or more were admitted to grade one. The study looked at them twelve years later. Interviews with students and parents were held and cumulative records studied. Conclusions were that early admission caused educational, social, and emotional impairment in many children. They recommended that the mental age of six was not realistic and that it be raised to seven.

One of the criticisms on studies of flexible admission is that they do not compare achievement of early entrants with that of normal entrants of equal ability (Halliwell, 1966). That is such studies just tell us that above average young entrants do as well or better than average older students. Perhaps they would have done even better if their schooling had been delayed a year. Birch, Tisdall, Barney & Marks (1965) and Braga (1969) did compare underage with regular age of similar I.Q. and found the underage were not at a disadvantage. King (1955), Carter (1956), Carrol (1963). Halliwell & Stein (1964), and Whyte (1972) also compared early and late starters of similar I.Q. and found the opposite. However, none of these studies involved flexible admissions, and special screening procedures. Neither did DeWitt's study (1961) but

recall that when his younger and older groups were matched on mental age, the younger group achieved better. Perhaps this should not be unexpected, for the younger group would have to have an I.Q. advantage in order to have the same mental age as the older group.

Weiss (1962) evaluated the achievement and adjustment of early admitted kindergarten children selected for emotional and social maturity. An I.Q. of one standard deviation above the mean was required on the Stanford Binet. These children were matched with the normal aged on I.Q. and personality adjustment. Matching was done with the California Test of Mental Maturity, and the California Test of Personality. Rating scale grades, personality scores, and social status were lower at the end of the year for the younger students. Even the older children of average I.Q. achieved better scores on the variables studied. Weiss concludes that early age children in kindergarten of above average I.Q. can be expected to achieve and adjust near the class average. Although they can be expected to achieve at a level higher than normal age children of low I.Q., they will not achieve at a par with older children of comparable I.Q.

Ilika's (1963) study, although not involving flexible entrance, is of interest in the present discussion. Unscreened early entrants were matched with older students on I.Q. The older students were superior in achievement. When he studied achievement as related to age and not grade however, he found the early entrants were initially superior but by 137 months, the differences were not significant. Ilika interpreted this as supporting the importance of maturation over development. An advantage of starting school nine months early did not result in any significant differences in achievement at age eleven, even when matched

for I.Q. A similar finding was reported by him in 1969.

Green and Simmons (1962), using anticipated achievement scores, found that early entrants in grade four would have been approximately seven months ahead of their present achievement had they waited a year. Results also showed that despite an extra year in school, they are only three months ahead of the regular entrant at a certain age. Although the early entrant group was achieving at a grade four level, it was not as high as the late group. Green and Simmons concluded that the minimum entrance age should not be raised for this would result in a year's loss of productive life. However, greater emphasis should be placed on providing for individual differences, such as ungraded primary units.

Halliwell (1966) took exception to their conclusion, saying "the advantages of postponing early entrance to first grade programs as they are presently conducted are very real (p. 40)."

In summary, a number of studies have demonstrated that a flexible admission program can be successful. The key to success is no doubt the thoroughness of the screening procedures. Nevertheless, the issue is still a controversial one, as evidenced by such papers as those written by Ollila (1971), Moore, Moon & Moore (1972), and Moore & Moore (1972).

Mental Age

The previous review indicates that the use of mental age as an admission criterion has been in use for some time. For example, Bigelow (1934) made a statement based on his study that a child who is chronologically below six years and four months of age and whose mental age is below six years has practically no chance of success.

Other mental age requirements were previously looked at with regards to Handy (1948), Hobson (1948), Birch (1954), Cone (1955),

Bevington (1957), Klein & Brenman (1965). Others including Braga (1969), Miller (1957), McLeod, Markowsky & Leong (1972), mention mental maturity was a factor in their flexible admission programs, but didn't specify particular cut-off points.

Kazienko (1954) found a multiple correlation of .825 between achievement and the combined factors of chronological age, mental age and I.Q. Partialling out chronological age and I.Q., he found the correlation between achievement and mental age to be .823.

Stake (1960), looked at the relationship between third grade achievement scores and Binet mental ages at the time of school entrance. He found a correlation of .57.

Dickinson & Larson (1936) indicated that mental age appeared to be a better predictor of achievement than I.Q.

Braga (1972) claimed mental age is more closely related to school achievement than chronological age is. He also mentioned that most schools having a flexible admission policy use mental age, and base it on the Stanford Binet. However, he points out the following:

> Studies that used various research designs have shown that no single criterion for the determination of school entrance adequately predicts school success. The factors that must be considered include chronological age, mental age, physical maturity, emotional and social maturity, and sex (Braga, 1972, p. 37).

A statement of Gates (1937), who is referred today (MacGinitie, 1969; Pikulski, 1973) in regards to the complex issue of readiness, puts the issue of mental age into further perspective. He was refuting those who were advocating a minimal mental age of six years, six months before formal reading instruction.

> It is quite conceivable -- indeed the evidence seems to show -- that the crucial mental age level will vary with the materials; the type of teaching; the skill of the

> teacher; the size of the class; the amount of preceding prepatory work; the thoroughness of examination; the frequency and the treatment of special difficulties, such as visual defects of the pupil; and other factors (Gates, 1937, p. 497 - 498).

In conclusion, mental age has been a popular criterion for school entrance where flexible admission policies have been in effect. However, in the literature reviewed it was always used in conjunction with other requirements.

Sex

A number of research studies previously mentioned showed there was a difference in the achievement of boys and girls in the elementary grades (Carter, 1956; DeWitt, 1961; Hall, 1963; Gott, 1963; Dickinson & Larson, 1963; Ilika, 1969). These differences favored the girls. Baer's study (1958), which followed the students' progress through the eleventh grade, found that girls were constantly marked higher than boys.

King (1955) looking at retentions in grade one, discovered eight out of eleven were boys, while Hall (1963) found three times as many boys as girls had been retained since entering grade one.

The literature generally agrees that girls excel over boys, especially in reading. Dwyer (1973) states the following:

> It has been a common research finding that girls are generally better readers than boys and that the magnitude of sex differences in reading is usually found to be greater than for sex differences in other measures of verbal abilities. Girls characteristically learn to read earlier, achieve higher scores on standardized reading tests (more markedly so in the primary grades) and account for a lower percentage of the pupils referred for remedial reading work than do boys (p. 455).

Others (Pauly, 1951; Olson, 1952; Gates, 1961; Ames & Ilg, 1964; Parsley, Powell & O'Connor, 1964; Stanchfield, 1965; Johnson, 1970; Hutt, 1972; Jantz, 1974) give support to such a statement.

Hutt (1972), Dwyer (1973), Hilton (1974), and Kohnstamm (1974) indicate that although girls excel in verbal and linguistic skills, boys have an edge in numerical and spatial aptitudes. However, Feldhusen, Kryspin, and Thurstone (1974), using research found in Klausmeier and Ripple (1971) report that boys were lower in math as well as in language and handwriting. Parsley, Powell & O'Conner (1964) did a study which only partially confirmed that boys excel in arithmetic. The boys were superior in arithmetic reasoning while the girls excelled in arithmetic fundamentals. Clark (1959) found no differences in math achievement of boys and girls.

The fact that differences have been found, especially in reading achievement and in behavioral problems (Bentzen, 1963; Weery & Quay, 1971; Chazen & Jackson, 1971, 1974) have led some to suggest that boys should begin school later than girls. Pauly (1951) asserted the following:

> Boys usually develop in nearly all respects more slowly than girls. Much research indicates that girls should be admitted at least three or four months younger than boys; or, better, that the entering age for boys should be raised three or more months (p. 1).

In 1959, an article in Phi Delta Kappan quoted Pauly as saying, based on a study he had recently completed on 29,992 children in grades two to eight,

> If boys are admitted six months or so later than girls, there will be less frustration for boys, their parents, and their teachers; and there will be fewer drop-outs of boys in high school because of failing, or unsatisfactory work (p. 281).

Others as well have supported or suggested a differential grade one entrance age for boys and girls (Ames & Ilg, 1964; Whyte, 1971).

Olson (1952) made the point that differences between the sexes are minimal when compared to differences existing between children of

the same sex. Thus, the solution is to deal individually, irrespective of sex. Clark (1959), and Parsley, Powell & O'Conner (1964) echoed similar messages.

Good & Brophy (1971), while conceding to differences between boys and girls in learning to read, concluded that "the educational significance of these differences does not appear to be exceedingly important — boys for the most part, suffer no harm from the initial gap and eventually catch up (p. 251)." Braga (1972) similarly felt no need for boys to start later than girls. A study by Tures (1972) indicated that significant differences in achievement favoring girls seemed to have disappeared by the tenth grade.

Rubin (1972), found that boys were developmentally ready to benefit from kindergarten given an additional year of maturity. Instead of advocating a differential age requirement for the sexes she emphasizes the need for "flexible school entrance policies and the elimination of rigid chronological age requirements .... (p. 273)." She hypothesizes that:

> Sex differences encompass more than a simple time differential on a single developmental continum. Rather, there may be several sex differences in biosocial development that need to be acknowledged and provided for in the school setting. Further investigation is necessary to determine whether more drastic changes such as differential curriculum, men teachers in the primary grades, or even separate classes for boys might be better means of providing for these differences (p. 273).

CHAPTER III

METHODOLOGY

Sample and Administrative Procedures

The students selected for this study were grade four students in the two Spruce Grove Elementary Schools. From the total grade four population, 16 students were subsequently eliminated to prevent any undue biasing of the results. The majority of those eliminated were enrolled in a special class. Others were from one to two years older than those being studied. Two students who were absent for part of the testing were also excluded. The final sample consisted of 198 students in eight classes.

All subjects were administered the Canadian Lorge-Thorndike Intelligence Tests, Level B (Wright, 1967), as well as selected subtests from the Canadian Tests of Basic Skills, Form 2 (King, 1968). Intelligence testing of all students was done first, followed by the achievement battery. All testing was done by the author in the children's classrooms during normal school hours, and was completed within a three week period during the month of May, 1974. Scheduling insured that testing times were the same each day for each class. Answer sheets were had scored by hired markers and reviewed for errors by the markers and the author.

Teachers were asked to list the five students in their respective classes whom they considered to be the best behaved, and the five whom they considered to be the poorest behaved. They were also requested to write down the names of any students in their classes whom they felt would benefit by repeating grade four (see Appendix 1).

The investigator also selected the five oldest (exclusive of fail-

ures) and the five youngest from each class. For each of these ten students, their teacher filled in the Walker Problem Behavior Identification Checklist (Walker, 1970 -- see Appendix 2). This was done after the teachers had selected best and poorest behaved, and candidates who might benefit from repeating, to prevent their selections from being influenced by names on the Walker Checklist.

Teachers were not told the purpose of this study until all information was in and testing completed.

Hypotheses

Appropriate null hypotheses were developed to test each of the stated aims of this study. A level of significance of .05 was designated as being necessary to reject the null hypotheses. These hypotheses along with results, will be reported in Chapter four.

Treatment of the Data

The achievement sub-tests included Vocabulary, Reading Comprehension, Language Skills, (Spelling, Capitalization, Punctuation, and Usage), and Mathematics Skills (Mathematics concepts and Mathematics Problem Solving). The sub-test raw scores were converted to standard scores with a mean of 50 and a standard deviation of 10. This enabled the calculation of a total achievement test score for each student as well as total scores for the Language and Mathematics Skills tests. All sub-test and total test standard scores were then subjected to a two-way analysis of variance to test for the significance of the difference between means when students were groups according to chronological age or sex.

Correlations between achievement scores and chronological age, achievement scores and mental age, and achievement scores and I.Q. were then calculated.

A student's mental age was derived from conversion tables in the Manual for Administration of the Canadian Lorge-Thorndike Intelligence Tests (Wright, 1967). Since both the Verbal and Non-verbal Batteries of the Canadian Lorge-Thorndike Intelligence Tests were administered, it was possible to arrive at a Verbal and Non-Verbal Mental Age for each student. Both were used in making comparisons.

Students were placed in one of two chronological age groupings. The early entrants were those whose sixth birthday fell between September 1, 1970 and February 28, 1971, making an age range of 67 - 72 months at the start of grade one. The late entrants had their sixth birthday fall between January 1, and August 31, 1970, making an age range of 73 - 80 months at the start of grade one. In order to test the comparability of early and late entrants on intelligence, both the mean Verbal and Non-verbal I.Q. of each group were calculated and compared, as were the mean Verbal and Non-verbal Mental Ages.

Weighted raw scores were used to test for the significance of the difference between means on the Walker Problem Behavior Identification Checklist. The forty youngest (five youngest from each class) were compared with the forty oldest (five oldest from each class). The final sample consisted of 39 in each group. Two of the subjects were excluded because of imcomplete test data. These 78 students were then regrouped according to sex and a similar analysis was conducted to test for the significance of the differences between means. The number of boys totaled 40 and the number of girls 38.

A chi-square analysis was conducted on students selected by their teachers to determine if stated poor classroom behavior was independent of chronological age. Similar analyses were carried out to determine if

stated poor behavior was independent of mental age and sex. Of the 40 students named by their teachers as "poorest behaved", four were excluded either because they were not part of the sample being studied, or test data was incomplete. This left a total of 76 students, -- 40 rated as "best behaved" and 36 as "poorest behaved". To determine if best or poorest behavior was independent of mental age, students in this sample were first ranked from oldest to youngest on Verbal Mental Age. They were then put into an "old" or "young" category by means of a median split. This procedure was repeated with Non-verbal Mental Age.

CHAPTER IV

RESULTS AND FINDINGS

Introduction

Analysis of the data was carried out as described in Chapter III. Raw achievement scores were first standardized and normalized for the total group, using a mean of fifty and a standard deviation of ten. A two-way analysis of variance was then conducted to test for the significance of differences between (a) early and late entrant means on the achievement scales, (b) boys' and girls' means on the achievement scales. As well, an opportunity was provided to look for significant interaction effects between entry groups and sex.

Pearson Product - Moment Correlations were then computed between the eleven achievement scales and (a) chronological age, (b) verbal mental age, (c) non-verbal mental age, (d) verbal I.Q., (e) non-verbal I.Q.

For purposes of discussion, another two way analysis of variance was conducted, similar to the first one, but dividing the students into five entrance groups instead of two. This will be explained fully later in the Chapter.

Tests of significance for the differences between the means of early and late entrants were then carried out, using the variable of (a) verbal mental age (b) non-verbal mental age (c) verbal I.Q. (d) non-verbal I.Q. This led to several analysis of covariance which will be explained later in the discussion.

The next analysis involved tests for the significance of the differences between means on the Walker Problem Behavior Identification Checklist for (a) early and late entrants, (b) boys and girls.

The final two analyses compared expected with actual probabilities

to determine if (a) teachers' selections of best and poorest behaved students were independent of the entrance age, sex, or mental age of the student, (b) teachers' selections of students whom they felt would benefit by repeating the grade were independent of the entrance age or sex of the student.

Null hypotheses along with results and discussions are given next. Tables summarizing results of each analysis are given for the various hypotheses. A significance level of .05 was deemed necessary for rejection of any of the hypotheses stated in this Chapter.

Table 1 below, describes the composition of the Early and Late Entrant Groups.

Table 1

Composition of Early and Late Entrant Groups

	Boys	Girls	Total	Verbal IQ 1	Non-Verbal IQ 2	Verbal M.A.	Non-Verbal M.A.	Mean Chronological Age At Entrance In Months
Early Entrants	35	43	78	109.96	115.46	122.87	134.96	68.38
Late Entrants	58	62	120	105.14	113.74	126.05	139.93	76.51

(1) Canadian Lorge-Thorndike Verbal IQ

(2) Canadian Lorge-Thorndike Non-Verbal IQ

Hypotheses Testing and Results

Tables 2 and 3 give the means and standard deviation of young and old boys and girls as well as their total means on the eleven achievement scales. Results of the two way analysis of variance are reported in Table

4, and are used to support or reject general hypotheses one and two, which developed out of the aims of the study.

General Hypothesis 1

There are no significant differences between early and late entrants on their corresponding achievement scores on the Canadian Tests of Basic Skills.

Results as given in Table 4 indicate that there were no significant differences between early and late entrants on the achievement variables of Vocabulary, Reading, Spelling, Capitalization, Usage, Math Problem Solving, Total Language, and Total Test.

Significant differences between early and late entrants were found on the achievement variables of Punctuation, Math Concepts, and Total Math. The means (Table 3) show that these differences favored the late entrants.

General Hypothesis 2

There are no significant differences between boys and girls on their correspoding achievement scores on the Canadian Tests of Basic Skills.

Results as given in Table 3 indicate that there were no significant differences between boys and girls on the achivement variables of Vocabulary, Reading, Math Concepts, Math Problem Solving, Total Math, and Total Test.

Significant differences between boys and girls were found on the achievement variables of Spelling, Capitalization, Punctuation, Usage, and Total Language. All of these differences favored the girls (Table 3).

Table 2

Achievement Means and Standard Deviations of Early Entrant (EE) and Late Entrant (LE) Boys and Girls

	MALE				FEMALE			
Achievement Scales	EE MEAN	N = 35 SD	LE MEAN	N = 58 SD	EE MEAN	N = 43 SD	LE MEAN	N = 62 SD
Vocabulary	49.84	11.01	50.11	10.33	49.29	9.82	50.36	8.44
Reading	48.90	9.74	49.70	10.78	49.58	10.08	51.18	8.24
Spelling	47.17	10.90	48.15	9.24	51.59	8.66	52.09	9.52
Capitalization	48.48	9.51	48.06	10.20	50.59	9.24	52.14	9.42
Punctuation	46.73	9.59	49.27	9.48	49.55	8.55	52.81	9.99
Usage	49.22	9.83	47.68	10.18	50.12	9.50	52.39	8.76
Math Concepts	48.17	9.26	52.17	11.57	47.87	8.46	50.36	8.57
Math Problem Solving	47.07	9.80	50.62	10.53	49.73	7.86	51.26	9.93
Total Language	47.31	9.34	48.00	9.72	50.62	8.82	52.97	9.88
Total Math	47.83	9.57	51.52	11.21	48.52	8.10	50.79	9.16
Total Test	47.83	10.40	49.34	10.26	49.44	8.87	52.20	9.13

Table 3

Total Achievement Means and Standard Deviations of Early Entrants (EE) and Late Entrants (LE) as well as Total Means and Standard Deviations for Males and Females

Achievement Scales	TOTAL EE N = 78		TOTAL LE N = 120		TOTAL MALE N = 93		TOTAL FEMALE N = 105	
	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
Vocabulary	49.53	10.31	50.24	9.37	50.01	10.54	49.92	9.00
Reading	49.27	9.87	50.46	9.54	49.40	10.35	50.53	9.03
Spelling	49.61	9.91	50.18	9.56	47.78	9.85	51.88	9.14
Capitalization	49.64	9.36	50.17	9.98	48.22	9.90	51.50	9.33
Punctuation	48.28	9.08	51.10	9.87	48.31	9.55	51.47	9.52
Usage	49.72	9.59	50.11	9.73	48.26	10.03	51.46	9.10
Math Concepts	48.01	8.77	51.24	10.13	50.67	10.88	49.34	8.58
Math Problem Solving	48.54	8.82	50.95	10.19	49.29	10.35	50.63	9.13
Total Language	49.14	9.15	50.57	10.08	47.74	9.53	52.01	9.49
Total Math	48.21	8.74	51.14	10.17	50.14	10.72	49.86	8.77
Total Test	48.71	9.56	50.82	9.76	48.77	10.28	51.07	9.09

Table 4

Results of Two-Way Analysis of Variance

CTBS SCALES

		Vocabulary		Reading		Spelling		Capitalization		Punctuation		Usage	
	df	SS	F	SS	F	SS	F	SS	F	SS	F	SS	F
Age	1	21.31	.22	68.13	.72	25.94	.29	15.63	.17	394.31	4.40*	6.69	.07
Sex	1	1.50	.02	55.56	.59	819.81	9.04**	449.38	4.84*	474.88	5.29*	371.38	4.08*
IA	1	7.94	.08	8.00	.08	3.00	.03	45.75	.49	6.63	.07	171.50	1.88
Error	194	18607.70		18260.60		17594.20		17996.30		17401.60		17668.60	

		Math Concepts		Math Problem Solving		Total Language		Total Math		Total Test	
	df	SS	F	SS	F	SS	F	SS	F	SS	F
Age		494.69	5.32*	303.00	3.23	108.81	1.20	417.44	4.46*	215.69	2.32
Sex		52.38	.56	126.81	1.35	807.44	8.92**	.63	.01	234.75	2.52
IA		27.25	.29	47.94	.51	32.88	.36	23.75	.25	18.69	.20
Error		18032.10		18193.20		17566.20		18145.80		18069.80	

* significant at .05 level
** significant at .01 level

Significant interaction between the factors of age and sex was not found on any of the achievement variables.

Results of the t-Tests between early and late entrants rated on the Walker Problem Behavior Identification Checklist are reported in Table 5. These are used to support or reject the following null hypothesis which developed out of the aims of this study.

General Hypothesis 3

There are no significant differences between early and late entrants on their mean problem scores as rated by their teachers on the Walker Problem Behavior Identification Checklist.

Table 5

t-Tests Between Early and Late Entrants on the Walker Problem Behavior Identification Checklist

Problem Scales	Early Entrants N=39		Late Entrants N-39			
	Mean	SD	Mean	SD	DF	t
Acting Out	2.92	5.30	2.21	3.46	76	.709
Withdrawal	1.77	2.71	1.31	2.02	76	.854
Distractability	2.92	3.19	2.77	2.93	76	.222
Disturbed Peer Relations	1.08	2.51	1.33	3.17	76	-.397
Immaturity	.74	1.94	1.05	1.78	76	-.730
Total	9.44	10.47	8.67	8.99	76	.348

Table 5 indicates there is no cause for rejection of general hypothesis 3 at the .05 level.

The above results would indicate that younger students in the sample do not exhibit more behavioral problems, as defined by the checklist, than do their older peers.

Results of t-Tests between boys and girls rated on the Walker Problem Behavior Identification Checklist are given in Table 6. These are used to support or reject the following null hypothesis which developed out of the aims of the study.

General Hypothesis 4

There are no significant differences between boys and girls on their mean problem scores as rated by their teachers on the Walker Problem Behavior Identification Checklist.

Table 6

t-Tests Between Boys and Girls on the Walker Problem Behavior Identification Checklist

Problem Scales	Boys N=40		Girls N=38			
	Mean	SD	Mean	SD	DF	t
Acting Out	3.4	5.23	1.68	3.32	76	1.720
Withdrawal	1.82	2.57	1.24	2.16	76	1.091
Distractability	3.95	3.30	1.68	2.26	76	3.519**
Disturbed Peer Relations	1.67	3.53	.71	1.78	76	1.512
Immaturity	1.02	1.91	.76	1.81	76	.620
Total	11.87	10.49	6.08	7.89	76	2.747**

** significant at .01 level.

NOTE: Acting Out, Distractability and Disturbed Peer Relations tested significant for unequal variances. Using the Welch Prime Adjustment of t-Tests for unequal variances however, did not change significance levels on the differences between means.

Table 6 indicates that there were no significant differences between boys and girls on the scales of Acting Out, Withdrawal, Disturbed Peer Relations, and Immaturity.

Significant differences between boys and girls were found on the scales of Distractability and Total score. The higher means of the boys indicate that they have been rated by their teachers as exhibiting more problems.

In summary, teachers did not rate the early entrants as exhibiting more behavorial problems, as defined by the above checklist. Boys however

did rate significantly higher on two comparisons.

As described in the previous chapter, the teachers were asked to select the five best behaved, and the five poorest behaved students in their classes. Four of the students named were subsequently excluded either because they were not part of the population being studied, or because the investigator had incomplete data on them. The remaining 76 students were used in a chi-square analysis. Results are reported in Table 7 and are used to support or reject null hypotheses five through twelve, which were developed out of the aims of this study.

Table 7

Chi-Square Analysis of Students Selected by Their Teachers as Best Behaved or Poorest Behaved

Behavior Variable	Age Variable			Sex Variable		
	EE	LE	Z	Boys	Girls	Z
Best Behaved	12	28	± 1.17	12	28	± 2.16*
Poorest Behaved	15	21	± .33	25	11	± 2.71**

Behavior Variable	Verbal Mental Age			Non-Verbal Mental Age		
	Young	Old	Z	Young	Old	Z
Best Behaved	15	25	± 1.60	15	25	±1.60
Poorest Behaved	23	13	± 1.67	23	13	±1.67

* significant at .05 level
** significant at .01 level

Hypothesis 5

There is no significant relationship between being an early or

late entrant and being selected as best behaved in class.

Results of the analysis support the null hypothesis, indicating that being selected by the teacher as best behaved was independent of the age factor. That is, neither the early nor late entrant group had a disproportionate representation of best behaved students.

Hypothesis 6

There is no significant relationship between being an early or late entrant, and being selected as poorest behaved in class.

Results of the analysis support the null hypothesis, indicating that being selected by the teacher as poorest behaved was independent of age. Neither the early nor late entrant group had disproportionate numbers of poorest behaved students.

Hypothesis 7

There is no significant relationship between sex and being selected by the teacher as best behaved in class.

Results of the analysis cause rejection of the null hypothesis at the .05 level. A disproportionate number of girls were selected by their teachers as best behaved.

Hypothesis 8

There is no significant relationship between sex and being selected by the teacher as poorest behaved in class.

Results of the analysis cause rejection of the null hypothesis at the .05 level. A disproportionate number of boys were selected by their teachers as being poorly behaved.

Hypothesis 9

There is no significant relationship between Verbal Mental Age and being selected by the teacher as best behaved in class.

Results of the analysis support the null hypothesis, indicating that in this sample, being rated as best behaved by the teacher was independent of Verbal Mental Age.

Hypothesis 10

There is no significant relationship between Verbal Mental Age and being selected by the teacher as poorest behaved in class.

Results of the analysis support the null hypothesis, indicating that being rated by the teacher as poorest behaved was independent of Verbal Mental Age.

Hypothesis 11

There is no significant relationship between Non-Verbal Mental Age and being selected by the teacher as best behaved in class.

Results of the analysis support the null hypothesis, indicating that being selected by the teacher as best behaved in this sample was independent of Non-Verbal Mental Age.

Hypothesis 12

There is no significant relationship between Non-Verbal Mental Age and being selected by the teacher as poorest behaved in class.

Results of the analysis support the null hypothesis indicating that being selected by the teacher as poorest behaved was independent of Non-Verbal Mental Age.

Table 8 shows the number of students by entrance age and by sex who were selected by the teachers as possibly benefiting from repeating grade four in the coming year. Results are used to support or reject hypotheses thirteen and fourteen which were developed out of the aims of the study.

Table 8

Chi-Square Analysis of Students Selected by Their Teacher as Possibly Benifiting From Repeating Grade Four

	Age Variable			Sex Variable		
	EE	LE	Z	Boys	Girls	Z
Would Benifit by Repeating	17	10	± 2.51*	18	9	± 2.05*

* significant at .05 level.

Hypothesis 13

There is no significant relationship between being an early or late entrant, and being selected by the teachers as likely to benefit by repeating grade four.

Results of the analysis cause rejection of the null hypothesis at .05 level, indicating that a significantly greater number of students selected were in the early entrant group.

Hypothesis 14

There is no significant relationship between sex and being selected by the teachers as likely to benefit from repeating grade four.

Results of the analysis cause rejection of the null hypothesis at the .05 level, indicating that a significantly greater number of boys over girls were selected.

The above results suggest that a student who is either an early entrant or a boy, has an increased chance of being rated by his teacher as needing extra help in grade four.

Discussion

Findings from general hypothesis 2 seem to be in agreement with Hutt (1972), Dwyer (1973), Hilton (1974), and Kohnstamm (1974) who con-

cluded that girls generally perform better in verbal and linguistic skills. However, the results of this analysis disagree with their further conclusion that boys do better in numerical abilities, as no significant differences were found. This is in agreement with the findings of Clark (1959). General hypothesis I suggests that age is more important than sex in regards to mathematics skills.

An interesting observation was that boys were not significantly lower than girls on the Vocabulary or Reading scales. General research findings, as mentioned in the survey of the literature indicates that girls are usually better readers than boys, especially in the early grades.

A further look at the relationship between chronological age and achievement is provided in Table 9. Pearson Product-Moment correlations were found between standardized achievement scores and chronological age. Four of the correlations were significant, and involved the scales of Punctuation, Math Concepts, Math Problem Solving, and Total Math. The small size of these correlations however, can account for only two or three per cent of the variance in making predictions. In contrast are the much higher correlations between achievement and verbal mental age, and achievement and verbal I.Q. Verbal mental age shows the highest correlations, with figures generally in the seventies. This would account for nearly 50 per cent of the variance in making predictions. These findings are in accord with Braga's (1972) claim that mental age is more closely related to school achievement than is chronological age. Like Dickinson and Larson's finding's (1963) mental age in this study appears to be a better predictor of achievement than I.Q., although differences here are not large. The generalization should not be made that

Table 9

Correlations Between the Achievement Scales and the Variables of Chronological Age, Verbal Mental Age, Non-Verbal Mental Age, Verbal I.Q. and Non-Verbal I.Q.

	C.A.	V.M.A.	N.V.M.A.	V.I.Q.	N.V.I.Q.
Vocabulary	.060	.820**	.408**	.795**	.394**
Reading	.061	.727**	.364**	.692**	.347**
Spelling	.072	.720**	.393**	.688**	.376**
Capitalization	.037	.649**	.466**	.631**	.452**
Punctuation	.145*	.625**	.466**	.568**	.438**
Usage	.029	.707**	.397**	.694**	.391**
Math Concepts	.165*	.747**	.617**	.678**	.569**
Math Problem Solving	.147*	.704**	.523**	.645**	.484**
Total Language	.094	.757**	.489**	.721**	.468**
Total Math	.160*	.762**	.607**	.695**	.561**
Total Test	.112	.851**	.528**	.801**	.499**

* significant at .05 level.

** significant at .01 level.

this relationship between mental age and achievement would hold if mental age was measured in grade one. Studies would have to be done in the school system which would relate mental age, as measured in grade one, with achievement in later grades.

The achievement data was further analyzed by dividing the students into five age groups as per entrance age in grade one. The first four groups consisted of students grouped together into three month intervals. Group one was 67 to 69 months of age, group two, 70 to 72 months, group three, 73 to 75 months, and group four, 76 to 78 months. Group five, the oldest, consisted of students who were 79 to 80 months old at time of entrance to grade one. These were the students who, under present admission regulations, could have started a year earlier. Tables 10, 11, and 12 report the means and standard deviations of the boys and girls in the various age groups, as well as total means and standard deviations, on the eleven achievement scales.

Table 13 summarizes the two way analysis of variance using the five age groups. Main effect differences on entrance age appeared only on the Punctuation scale. Further analysis by way of multiple comparisons however, revealed that none of the five age groups showed significance with any other on this scale. Two groups (groups one and three, and groups one and five) approached significance in favor of the older group in each pair (see Table 12).

Comparisons between boys and girls as in the previous analysis, showed significant differences favoring the girls on the achievement variables of Spelling, Capitalization, Punctuation, Usage, and Total Language. At the .10 level of significance for interaction effect, there also results a significant difference (.05 level) between boys

Table 10

Male Achievement Means and Standard Deviations

in the Five Age Groups

Achievement Scales	Age Groups in Months at Time of Entry into Grade One									
	67-69 N=15		70-72 N=20		73-75 N=22		76-78 N=22		79-80 N=14	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Vocabulary	50.39	10.65	49.42	11.54	51.28	12.40	50.26	9.11	48.04	8.88
Reading	49.10	10.83	48.74	9.13	50.15	12.22	50.81	9.23	47.25	11.06
Spelling	47.12	10.36	47.21	11.56	47.80	10.94	49.02	7.19	47.34	9.78
Capitalization	50.03	8.44	47.31	10.30	50.14	11.50	48.45	9.50	44.20	8.56
Punctuation	43.25	9.42	49.34	9.08	51.70	10.00	48.55	7.69	46.60	10.89
Usage	49.30	9.45	49.16	10.35	49.76	11.05	46.48	10.01	46.27	9.19
Math Concepts	47.22	10.42	48.90	8.51	53.10	13.88	53.40	9.35	48.91	10.92
Math Problem Solving	44.34	10.58	49.13	8.89	52.49	9.76	50.37	10.75	48.08	11.50
Total Language	47.07	7.74	47.48	10.57	49.65	11.20	47.64	8.50	45.95	9.24
Total Math	45.89	10.90	49.30	8.45	53.12	12.71	52.05	10.04	48.20	10.50
Total Test	47.56	10.40	48.02	10.66	50.79	12.03	49.80	8.08	46.36	10.43

Table 11

Female Achievement Means and Standard Deviations in the Five Age Groups

Achievement Scales	Age Groups in Months at Time of Entry into Grade One									
	67-69 N=20		70-72 N=23		73-75 N=22		76-78 N=31		79-80 N=9	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Vocabulary	48.72	10.88	49.78	9.02	48.04	9.38	50.10	7.40	56.90	6.65
Reading	49.35	10.35	49.78	10.08	50.06	9.06	50.48	7.75	56.34	6.48
Spelling	49.82	7.95	53.13	9.13	51.12	11.94	51.16	7.57	57.67	7.82
Capitalization	48.00	9.19	52.84	8.86	49.61	11.63	52.18	7.60	58.18	6.78
Punctuation	47.81	8.35	51.06	8.61	52.19	9.58	51.29	10.09	59.56	8.73
Usage	50.70	9.94	49.62	9.29	51.44	10.45	51.35	7.55	58.33	6.19
Math Concepts	47.99	9.77	47.77	7.36	49.20	8.82	48.93	7.99	58.16	8.06
Math Problem Solving	48.81	8.20	50.52	7.65	48.67	13.06	51.17	7.32	57.88	5.97
Total Language	48.81	8.12	52.20	9.28	51.28	11.49	51.90	8.19	60.81	8.00
Total Math	47.95	9.17	49.01	7.22	48.77	10.55	50.17	8.17	57.86	5.38
Total Test	48.61	9.52	50.15	8.42	50.82	10.88	51.05	7.49	59.54	6.62

Table 12

Total Achievement Means and Standard Deviations

in the Five Age Groups

Achievement Scales	Age Groups in Months at Time of Entry into Grade One									
	67-69 (1) N=35		70-72 (2) N=43		73-75 (3) N=44		76-78 (4) N=53		79-80 (5) N=23	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Vocabulary	49.44	10.65	49.61	10.14	49.66	10.99	50.16	8.07	51.51	9.06
Reading	49.24	10.40	49.30	9.55	50.10	10.63	50.62	8.31	50.81	10.40
Spelling	48.66	9.02	50.38	10.63	49.46	11.44	50.27	7.42	51.38	10.26
Capitalization	48.87	8.80	50.27	9.84	49.87	11.43	50.63	8.56	49.67	10.42
Punctuation	45.85	8.98	50.26	8.77	51.94	9.68	50.15	9.19	51.65	11.83
Usage	50.10	9.62	49.40	9.68	50.60	10.66	49.33	8.90	51.00	10.00
Math Concepts	47.66	9.91	48.29	7.84	51.11	11.65	50.78	8.78	52.53	10.25
Math Problem Solving	46.89	9.42	49.88	8.18	50.58	11.56	50.84	8.82	51.92	10.73
Total Language	48.07	7.89	50.01	10.07	50.47	11.25	50.13	8.51	51.77	11.34
Total Math	47.07	9.85	49.14	7.72	50.94	11.75	50.95	8.95	51.98	9.94
Total Test	48.16	9.77	49.16	9.47	50.81	11.34	50.53	7.69	51.52	11.11

Table 13

Result of 2-Way Analysis of Variance Using Five Age Groups

		Vocabulary		Reading		Spelling		Capitalization		Punctuation		Usage	
	df	SS	F	SS	F	SS	F	SS	F	SS	F	SS	F
Age	4	152.94	.40	134.75	.35	233.38	.64	70.56	.20	1059.37	3.07*	209.81	.58
Sex	1	31.06	.32	177.19	1.86	1061.94	11.66**	762.19	8.47**	901.81	10.44**	746.00	8.19**
I.A.	4	571.13	1.49	397.56	1.05	319.19	.88	1085.12	3.02*	644.94	1.87	596.06	1.64
Error	188	17994.7		17862.2		17122.7		16909.5		16239.1		17132.9	

		Math Concepts		Math Problem Solving		Total Language		Total Math		Total Test	
	df	SS	F	SS	F	SS	F	SS	F	SS	F
Age	4	709.38	1.94	644.19	1.75	409.50	1.15	657.38	1.79	388.38	1.06
Sex	1	.94	.01	284.75	3.10	1317.81	14.86**	48.56	.53	555.69	6.04*
I.A.	4	844.81	2.31	771.00	2.10	744.38	2.10	801.25	2.18	732.50	1.99
Error	188	17172.4		17256.9		16671.9		17268.8		17301.9	

* significant at .05 level

** significant at .01 level

and girls on the Total Test score, with of course, the girls doing better (Tables 3, 10, and 11).

Interaction between age and sex became significant on the Capitalization scale. At the .10 level there was also a significant interaction effect on Math Concepts, Math Problem Solving, Total Language, Total Math and Total Test. The interaction effect is illustrated in Table 14 below for the Capitalization scale. It can be seen that not only age but sex as well is affecting group means.

Table 14

Age Group Means for Capitalization Showing Interaction

	ENTRANCE AGE GROUPS				
	1	2	3	4	5
Males	50.03	47.31	50.14	48.45	44.20
Females	48.00	52.84	49.61	52.18	58.18

An analysis of variance was carried out between early and late entrants on the variables of non-verbal mental age, verbal mental age, non-verbal I.Q. and verbal I.Q. Means and standard deviations are reported in Table 15, and the analysis of variance in Table 16.

Table 15

Mean I.Q.'s and Mental Ages of Early and Late Entrants

	Early Entrants		Late Entrants	
	Mean	SD	Mean	SD
Verbal Mental Age	122.87	13.90	126.05	13.71
Non-verbal Mental Age	134.96	19.95	139.93	21.43
Verbal I.Q.	109.96	13.83	105.14	12.94
Non-verbal I.Q.	115.46	14.61	113.74	14.69

Table 16

Analysis of Variance Between Early and Late Entrants' I.Q.'s and Mental Ages

	SS	DF	F
Verbal Mental Age	478	1	2.51
Non-Verbal Mental Age	1165	1	2.68
Verbal I.Q.	1099	1	6.22*
Non-Verbal I.Q.	140	1	0.65

* significant at .05 level.

The above information reveals a significant difference, favoring the early entrants, on verbal I.Q. A further breakdown of the verbal I.Q. means is given below for the five previously defined age groups.

Table 17

Verbal I.Q.'s For the Five Age Groups

Age Groups as Per Entry Age	Verbal I.Q. in Grade Four	
	Boys	Girls
67-69 months	112.00	112.00
70-72 months	105.40	110.83
73-75 months	106.18	104.82
76-78 months	106.64	104.42
79-80 months	98.93	111.89

It appears there may have been a selection factor operating with the youngest group of boys and girls, as well as with the oldest boys. It would appear that parents sent their chronologically young children to grade one if they seemed mature enough, but retained the less mature, as suggested by the mean I.Q. of the oldest boys' group. Table 10 shows that the achievement means of the oldest boys' group as well as the two youngest groups were generally lower than the third and fourth groups.

Means for the girls' age groups (Table 11) show that the youngest group generally did not achieve means as high as the older groups. Means of the group that waited a year are considerably higher than the other groups. The fourth oldest group, which had the lowest mean I.Q., had a slight advantage over the youngest group on all the achievement means.

The above discussion is merely descriptive and caution must be exercised in drawing any conclusions. A within-cell analysis of achievement was not carried out as part of this study. Furthermore, groups are being described which contain rather small numbers of subjects.

Because of the significant differences found on verbal I.Q. between early and late entrants, a two-way analysis of covariance was conducted to equalize the effects of I.Q. All achievement means were calculated with the covariate of I.Q. made equal to 100. Mean achievement estimates for early and late entering boys and girls as well as their total means were thus derived and are reported in Table 18. Table 19 reports on the analysis of variance. It shows significant differences at the .01 level on all the achievement variables except Capitalization, which was at the .05 level. The means all favor the late entrants.

Significant differences favoring the girls appeared on the scales of Spelling, Capitalization, Punctuation, and Total Language. The boys were significantly better than girls on Math Concepts. Thus, as compared to the analysis without covariance, significant scales remained the same, with the exception of Usage, which lost its significance, and Math Concepts, which came into significance favoring the boys.

Significant interaction between age and sex appeared only on the Usage scale. Recall that no significant interaction appeared on the analysis without covariance.

Table 18

Achievement Mean Estimates of Early and Late Entrant Boys and Girls as well as Total Means when IQ is Used as a Covariate

	MALE			FEMALE			TOTAL EE	TOTAL LE
	EE N=35 MEAN	LE N=58 MEAN	TOTAL N=93 MEAN	EE N=43 MEAN	LE N=62 MEAN	TOTAL N=105 MEAN	MEAN	MEAN
Vocabulary	44.88	47.34	46.41	42.44	46.96	45.11	43.54	47.14
Reading	44.61	47.30	46.28	43.65	48.24	46.36	44.08	48.09
Spelling	43.01	45.82	44.76	45.84	49.23	47.84	44.57	47.58
Capitalization	44.62	45.91	45.42	45.26	49.49	47.76	44.97	47.76
Punctuation	43.17	47.27	45.73	44.63	50.37	48.01	43.97	48.87
Usage	44.99	45.311	45.19	44.28	49.49	47.36	44.60	47.47
Math Concepts	43.79	49.72	47.49	41.82	47.36	45.09	42.71	48.50
Math Problem Solving	43.01	48.35	46.34	44.10	48.47	46.68	43.61	48.41
Total Language	42.87	45.51	44.52	44.48	49.93	47.70	43.76	47.79
Total Math	43.39	49.04	46.91	42.38	47.74	45.54	42.83	48.37
Total Test	42.82	46.54	45.14	42.51	48.77	46.20	42.65	47.69

Table 19

Results of 2-Way Analysis of Coveriance - Two Age Groups

		Vocabulary		Reading		Spelling		Capitalization		Punctuation		Usage	
	df	SS	F	SS	F	SS	F	SS	F	SS	F	SS	F
Age	1	554.00	17.40**	604.21	13.10**	439.64	9.66**	347.49	6.45*	1104.23	19.42**	349.27	7.83**
Sex	1	92.64	2.91	.00	.00	454.41	9.98**	208.02	3.86	241.37	4.25*	140.71	3.16
I.A.	1	49.50	1.55	42.20	.91	4.03	.09	101.92	1.89	31.47	.55	280.63	6.30*
I.Q.	1	12470.46	391.20**	9365.94	203.10**	8807.94	193.41**	7579.80	140.62**	6445.20	113.37**	9083.18	203.83**
Error	193	6152.31		8900.38		8789.06		10402.44		10972.44		8600.44	

		Math Concepts		Math Problem Solving		Total Language		Total Math		Total Test	
	df	SS	F	SS	F	SS	F	SS	F	SS	F
Age	1	1499.43	34.97**	1073.01	21.19**	745.87	32.88**	1382.19	32.88**	1135.12	41.23**
Sex	1	219.25	5.11*	17.19	.34	424.65	10.85**	62.38	1.48	43.07	1.56
I.A.	1	1.77	.04	11.21	.22	91.66	2.34	.95	.02	74.97	2.72
I.Q.	1	9751.75	227.40**	8418.59	166.22**	10029.54	256.29**	10039.54	238.81**	12761.72	463.51
Error	193	8276.50		9774.75		7552.50		8113.81		5313.88	

* significant at .05 level

** significant at .01 level

A further analysis of covariance was conducted, this time using the five age groups. Table 20 gives the mean achievement estimates for boys and girls in the five age groups as well as total means for boys and total means for girls. Table 21 gives total achievement mean estimates for the five age groups when boys and girls are combined. Table 22 reports on the analysis of variance.

As with the just previous analysis, significant differences occurred on all of the achievement scales when age was the main criterion. These will be further analyzed shortly.

Differences between boys and girls favoring the girls again appeared on the language tests, this time including Usage. The Total Test scale favored the girls as well. Boys did not do significantly better on Math Concepts as they did on the previous analysis.

Interaction between age and sex was again limited to the Usage scale.

Table 23 gives Scheffe multiple comparisons of age effects for the various achievement scales. It shows that significant differences on achievement did not occur between groups five and four, five and three, four and three, four and two, and three and two.

Groups five and four, the two oldest groups, did significantly better than group one on all scales except Capitalization. Group three did significantly better than group one on all scales except Reading, Spelling and Capitalization. Group two did significantly better than group one on Math Problem Solving and Punctuation.

Group two did not do significantly poorer than the older groups except when compared with group five, and even then only on two of the scales -- Math Concepts and Total Test.

Table 20

Achievement Mean Estimates of Boys and Girls in the Five Age Groups as well as Total Means When I.Q. is Used as a Covariate

	MALES						FEMALES					
	67 - 69 mo N=15	70 - 72 mo N=20	73 - 75 mo N=22	76 - 78 mo N=22	79 - 80 mo N=14	Total N=93	67 - 69 mo N=20	70 - 72 mo N=23	73 - 75 mo N=22	76 - 78 mo N=31	79 - 80 mo N=9	Total N=105
Vocabulary	43.11	46.14	47.53	46.23	48.70	46.39	41.44	43.22	45.12	47.42	49.69	45.07
Reading	42.81	45.91	46.90	47.33	47.82	46.27	43.05	44.10	47.54	48.16	50.10	46.33
Spelling	40.94	44.44	44.62	45.61	47.90	44.71	43.64	47.56	48.65	48.89	51.55	47.78
Capitalization	44.49	44.82	47.28	45.38	44.70	45.46	42.46	47.84	47.39	50.14	52.69	47.81
Punctuation	37.96	46.97	48.98	45.63	47.04	45.68	42.52	46.29	50.07	49.35	54.32	47.95
Usage	43.08	46.36	46.56	43.04	46.85	45.16	44.48	44.00	48.95	49.06	52.16	47.32
Math Concepts	40.84	46.02	49.73	49.88	49.48	47.50	41.61	42.02	46.64	46.58	51.84	45.10
Math Problem Solving	38.29	46.42	49.38	47.03	48.63	46.29	42.77	45.07	46.25	48.95	51.89	46.61
Total Language	40.56	44.56	46.30	44.04	46.54	44.50	42.30	46.33	48.67	49.51	54.36	47.68
Total Math	39.35	46.36	49.75	48.43	48.79	46.89	41.42	43.11	46.15	47.76	51.38	45.51
Total Test	40.22	44.72	47.01	45.74	47.02	45.12	41.27	43.53	47.88	48.35	52.27	46.18

Table 21

Total Achievement Means for the Five Age Groups When I.Q. is Used as a Covariate

	Total Achievement Means (Boys and Girls Combined)				
	67-69 Mo. N=35	70-72 Mo. N=43	73-75 Mo. N=44	76-78 Mo. N=53	79-80 Mo. N=23
	Mean	Mean	Mean	Mean	Mean
Vocabulary	42.16	44.57	46.33	46.93	49.08
Reading	42.94	44.94	47.22	47.82	48.71
Spelling	42.49	46.11	46.63	47.53	49.33
Capitalization	43.33	46.43	47.33	48.16	47.83
Punctuation	40.57	46.60	49.52	47.80	49.89
Usage	43.88	45.10	47.75	46.56	48.93
Math Concepts	41.28	43.88	48.19	47.95	50.41
Math Problem Solving	40.85	45.70	47.82	48.15	49.90
Total Language	41.56	45.50	47.49	47.24	49.60
Total Math	40.53	44.62	47.95	48.04	49.81
Total Test	40.82	44.08	47.44	47.27	49.07

Table 22

Results of 2-Way Analysis of Covariance - Five Age Groups

		Vocabulary		Reading		Spelling		Capitalization		Punctuation		Usage	
	df	SS	F	SS	F	SS	F	SS	F	SS	F	SS	F
Age	4	772.95	6.23**	737.13	3.95**	837.55	4.72	509.05	2.43*	2090.48	9.99**	578.61	3.00*
Sex	1	41.10	1.32	8.38	.18	496.25	11.18**	336.81	6.44*	448.90	8.58**	287.32	6.56*
I.A.	4	148.49	1.20	73.97	.40	9.87	.06	467.51	2.24	307.31	1.47	464.13	2.65*
I.Q.	1	12169.56	392.64**	9110.25	195.35**	8755.42	197.17**	7070.65	135.23**	6424.86	122.79**	8898.18	203.13**
Error	187	5795.88		8720.94		8303.69		9777.56		9784.63		8191.69	

		Math Concepts		Math Problem Solving		Total Language		Total Math		Total Test	
	df	SS	F	SS	F	SS	F	SS	F	SS	F
Age	4	1813.01	10.83**	1687.43	8.92**	1251.02	8.51**	1840.23	11.57**	1467.10	14.02**
Sex	1	92.78	2.22	47.23	1.00	646.01	17.58**	14.35	.36	129.86	4.96*
I.A.	4	245.32	1.47	383.09	2.03	223.48	1.52	280.27	1.76	176.00	1.68
I.Q.	1	9333.39	233.07**	8383.25	177.28*	9737.90	265.03*	9807.52	246.68**	12375.99	473.16**
Error	187	7824.31		8842.81		6870.75		7434.75		4891.19	

* significant at .05 level

** significant at .01 level

Table 23-1

Scheffe Multiple Comparisons of Age Effects for the Achievement Scales

	Vocabulary		Reading		Spelling		Capitalization		Punctuation		Usage	
	Contrasts	F	Contrasts	F	Contrasts	F	Contrasts	F	Contrasts	F	Contrasts	F
2 vs 1	2.40	.88	2.08	.44	3.71	1.46	2.86	.74	6.39	3.68**	1.40	.21
3 vs 1	4.05	2.49*	4.29	1.86	4.34	1.99	3.86	1.34	9.28	7.74**	3.97	1.69
3 vs 2	1.65	.47	2.21	.57	.63	.05	1.01	.10	2.89	.86	2.57	.81
4 vs 1	4.55	3.35*	4.82	2.49*	4.95	2.77*	4.29	1.76	7.25	5.03**	2.27	.59
4 vs 2	2.15	.86	2.74	.93	1.25	.20	1.43	.23	.86	.08	.87	.10
4 vs 3	.50	.04	.52	.03	.62	.05	.43	.02	-2.03	.47	-1.70	.39
5 vs 1	6.91	5.06**	6.03	2.56*	7.43	4.09**	5.22	1.71	10.44	6.84**	5.73	2.46*
5 vs 2	4.51	.05	3.95	.31	3.73	1.13	2.37	.39	4.05	1.13	4.32	1.54
5 vs 3	2.86	.97	1.74	.92	3.09	.79	1.36	.13	1.16	.09	1.75	.26
5 vs 4	2.36	.69	1.21	.97	2.48	.53	.93	.06	3.19	.75	3.46	1.05

Table 23-2

Scheffe Multiple Comparisons of Age Effects for the Achievement Scales

	Math Concepts		Math Problem Solving		Total Language		Total Math		Total Test	
	Contrasts	F	Contrasts	F	Contrasts	F	Contrasts	F	Contrasts	F
2 vs 1	2.80	.88	5.21	2.71	4.01	2.06	4.35	2.24	3.38	2.06
3 vs 1	6.97	5.45**	7.28	5.28**	6.05	4.69**	7.57	6.77**	6.70	8.06**
3 vs 2	4.17	2.24	2.07	.49	2.05	.62	3.22	1.40	3.32	2.27
4 vs 1	7.00	5.88**	7.46	5.89**	5.34	3.89**	7.71	7.50**	6.30	7.60**
4 vs 2	4.20	2.46	2.44	.62	1.33	.28	3.36	1.65	2.92	1.90
4 vs 3	.04	.00	.17	.00	-.71	.08	.15	.00	-.39	.04
5 vs 1	9.44	6.99**	9.73	6.57**	9.02	7.27**	9.70	7.78**	8.90	9.94**
5 vs 2	6.64	3.81**	4.52	1.56	5.01	2.47	5.35	2.60	5.52	4.21**
5 vs 3	2.47	.53	2.44	.46	2.96	.87	2.14	.42	2.20	.68
5 vs 4	2.44	.54	2.27	.42	3.67	1.41	1.99	.38	2.60	.99

* significant at .05 level

** signiviant at .01 level

In summary, the analysis shows that when groups have been equalized for I.Q. the youngest group is at a statistical disadvantage in achievement — a disadvantage that increases with age spread. However, these findings have to be interpreted with proper judgement. There is a fairly strong relationship between the verbal I.Q. and achievement measures used in this study (Table 9). Verbal I.Q. is affected by achievement and exposure to learning situations in school. In fact, many of the items on the verbal I.Q. tests and achievement tests are likely measuring the same thing. It is therefore quite possible that by measuring I.Q. in grade four and using it as a covariate for achievement, one is removing the benefits that may have accrued by starting school at an earlier age. To then say that early entrants do not do as well as late entrants when I.Q. is held constant would seem a distortion of the facts. a way out of this dilemma would be to match subjects on I.Q. in grade one, before comparing their achievements in later grades.

Table 24 gives the mean grade equivalents for the five age groups, as well as the highest and lowest grade equivalent that occurred in each group. The grade equivalents for each child were derived from tables in the C.T.B.S.'s manual and are measured in tenths of a school year. The means of all groups are generally well within the fourth grade. In looking at these means, the spread of scores that make up the mean should not be forgotten.

The maximum and minimum grade equivalents are a reminder of the exceptional students that exist in all of the age groups.

In terms of the behavior ratings carried out in this study, results from testing hypotheses three through twelve revealed that sex was the important criterion relating to student behavior. Boys were

Table 24-1

Mean Grade Equivalents for Each of the Five Age Groups as well as Their Maximum and Minimum Values

	67-69 Months			70-72 Months			73-75 Months		
	GE	Max Value	Min. Value	GE	Max. Value	Min. Value	GE	Max. Value	Min. Value
Vocabulary	4.79	7.0	2.0	4.78	7.0	1.8	4.83	7.0	1.5
Reading	4.72	6.4	2.7	4.74	6.8	2.9	4.85	6.8	2.3
Spelling	4.86	7.2	1.7	5.11	7.7	2.4	4.96	7.7	2.4
Capitalization	4.53	6.6	2.5	4.65	7.0	2.1	4.63	7.2	1.6
Punctuation	4.41	6.7	2.1	4.99	7.0	2.1	5.15	7.4	2.8
Usage	4.63	6.3	2.3	4.55	6.7	2.1	4.60	7.4	2.3
Math Concepts	4.49	6.5	2.3	4.55	6.1	3.0	4.83	6.7	2.3
Math Problem Solving	4.48	6.6	2.4	4.81	6.6	2.8	4.86	7.1	2.6

Table 24-2

Mean Grade Equivalents for Each of the Five Age Groups as well as Their Maximum and Minimum Values

	76-78 Months			79-80 Months		
	GE	Max. Value	Min. Value	GE	Max. Value	Min. Value
Vocabulary	4.98	6.6	2.2	5.13	6.8	2.0
Reading	4.95	6.5	2.9	4.92	6.3	3.0
Spelling	5.11	7.2	2.4	5.26	7.7	2.0
Capitalization	4.78	6.6	1.8	4.62	6.6	2.3
Punctuation	4.96	7.0	2.6	5.10	6.8	2.3
Usage	4.57	6.3	1.6	4.80	6.3	2.7
Math Concepts	4.78	6.5	3.0	4.91	5.9	3.0
Math Problem Solving	4.91	6.9	2.8	5.05	6.9	2.6

perceived by their teachers as presenting more behavioral problems than girls. This is in accord with the findings of Bentzen (1963); Weery and Quay, 1971; Chazen and Jackson, 1971, 1974; and others.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Restatement of the Problem

In May, 1974, 198 grade four students in Spruce Grove were studied in an attempt to answer the following questions:

1) Is there a difference in school achievement between those students who started school just on or before their sixth birthday (early age entrants) and those who started after their sixth birthday (late age entrants)?

2) Is there any difference in the level of achievement between boys and girls?

3) Do teachers select students who have begun school at an earlier age as presenting more behavorial problems?

4) Do teachers select more boys or girls as presenting behavorial problems?

5) Do teachers select more students who began school early as possibly benefiting by repeating grade four?

6) Do teachers select more boys or girls as possibly benefiting by repeating grade four?

7) To what degree are a student's achievement and behavioral problems related to his mental age?

Summary of Findings

1) Late entrants did significantly better than early entrants on three of the eleven comparisons made on the Canadian Tests of Basic Skills. These involved the achievement variables of Punctuation, Math Concepts, and

Total Math

2) Girls did significantly better than boys on the achievement variables of Spelling, Capitalization, Punctuation, Usage, and Total Language.

3) Significant interaction between entrance age and sex was not found on any of the achievement variables.

4) There were no significant differences between early and late entrants on ratings done by their teachers on the Walker Problem Behavior Identification Checklist.

5) Boys were rated by their teachers as having significantly more problems than girls on the Walker Problem Behavior Identification Checklist Scales of Distractability and Total Score.

6) There was no significant difference between the number of early entrants and late entrants selected by the teachers as "best behaved", or "poorest behaved".

7) Girls were selected significantly more often by their teachers as "best behaved".

8) Boys were selected significantly more often by their teachers as "poorest behaved".

9) There was no significant difference in the number of younger or older mental age students selected by their teachers as "best" or "poorest" behaved, regardless of which mental age (verbal or non-verbal) was used.

10) Teachers selected early entrant students significantly more often as likely to benefit by repeating grade four.

11) Teachers selected boys significantly more often as

likely to benefit by repeating grade four.

12) Amongst the factors of chronological age, I.Q. and mental age, verbal mental age as measured in grade four showed the highest correlation with achievement.

Conclusions and Recommendations

The group achievement means of grade four students who entered school before they were six were all lower than the group means of their older grade peers. Only three of the eleven means however, were significantly different. The early group of students also had more than its share of members selected by the teachers as likely to benefit by repeating the grade. There was no evidence that they exhibited any more behavioral problems than the older students.

Boys' achievement means were significantly lower than girls' on five comparisons. As well, teachers selected significantly more boys than girls as likely to benefit from repeating a grade. In terms of "poorest behaved" in class, and were rated on the Walker Problem Behavior Identification Checklist as having significantly more problems than girls. Girls were chosen more often as "best behaved".

Many factors combine to create the individual differences found in any beginning grade one class. Hopefully the schools, within their limitations, can accommodate to most of these differences. Data from the above summary has to be used with proper judgment. In terms of achievement, the relative standing amongst the various groups would suggest that early entrant boys as well as those boys who started a year late (79-80 months at entrance) might pose the greatest problem. However, the differences between their scores and the scores of other groups are

not generally large. Similarly, although three differences between early and late entrants were found to be significant, an inspection of these differences reveals how small they are in terms of educational implications. The general conclusion from this study must be that no particular age or sex group was at a severe achievement disadvantage in terms of the other groups.

The poorer behavior rating of boys over girls points out the need for more research in this area. One such investigation should consider the effects of male teachers on the behavior of boys in the elementary grades.

When groups were equated for I.Q., the achievement differences between early and late entrants increased substantially. Significance occurred, favoring the late entrants on all the achievement variables. However, as I.Q. was measured in grade four, interpretations of these findings relative to early and late entrants are inconclusive. There is need for a further study which would control for the I.Q. factor from grade one.

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APPENDIX I

1. List the five best behaved students in class.

   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

2. List the five poorest behaved students in class.

   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

3. Who, in your estimation, would benefit by spending another year in grade 4? List name(s) on line(s) below.

   _____

   _____

   _____

   _____